DOCUMENT RESUME

ED 164 745 CE 013 388

AUTHOR Branson, Robert K.; And Others

TITLE Interservice Procedures for Instructional Systems Development: Task V Final Report.

INSTITUTION Florida State Univ., Tallahassee. Center for Educational Technology.

SPONS AGENCY Army Combat Arms Training Board, Ft. Benning, Ga.
PUB DATE Jan 77
CONTRACT N61339-73-C-0150
NOTE 62p.; For related documents see ED 122 018-022

EDRS PRICE MF-$0.83 HC-$3.50 Plus Postage.
DESCRIPTORS *Armed Forces; *Educational Coordination; Educational Programs; Instructional Design; *Instructional Systems; *Military Training; Program Evaluation; Program Validation; Staff Improvement; *Systems Development; Task Analysis
IDENTIFIERS Army; United States

ABSTRACT

Based on a state-of-the-art analysis of Army training, this report was the initial step in an effort to systematically improve the training in the combat arms and ultimately the entire Army. This study found that a comprehensive set of procedures was needed to provide for the development of effective training and for assessment of the training's effectiveness. In response to Task V contract requirements, an instructional systems development (ISD) model was formulated. The model contains five phases: analyze, design, develop, implement, and control. The initial step was to verify the content validity of the material and then conduct extensive formative evaluation. Performance and attitudinal data gathered during field trials of the material were used to determine where revisions were necessary in the final product. The completed package of validated materials, "The Interservice Procedures for Instructional Systems Development," includes a five-volume set of manuals (available in ERIC as ED 122 018-022) covering all phases of the procedures and a series of workshops for technical and management level personnel involved in the use of ISD. (Author/CSS)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED164745

Contract Number N61339-73-C-0150

INTERSERVICE PROCEDURES FOR INSTRUCTIONAL SYSTEMS DEVELOPMENT:

TASK V FINAL REPORT

Robert K. Branson, Principal Investigator
Barry M. Wagner
Gail T. Rayner

Center for Educational Technology
Florida State University
Tallahassee, FL 32306

January 1977

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

Prepared for:

The President
U.S. Army Combat Arms Training Board
Ft. Benning, Georgia 31905

CET/CATB-77-1

CE 013 388

TABLE OF CONTENTS

EXECUTIVE SUMMARY	1
INSTRUCTIONAL SYSTEMS DEVELOPMENT	5
BASES FOR ISD	5
SYSTEMS APPROACH TO TRAINING	6
HOW DOES ISD DIFFER FROM EXISTING PRACTICE	8
POTENTIAL BENEFITS OF ISD	9
CONTRACT HISTORY	13
TASK I	13
TRADOC REGULATION 350-100-1	15
THE INTERSERVICE COMMITTEE	17
THE MODEL	18
RESOURCES AND REVIEW	18
CONTENT VALIDITY	20
FORMATIVE EVALUATION	20
IPISD PACKAGE	25
THE MANUALS	25
THE WORKSHOPS	28
SUMMARY	37
APPENDIX A: REFERENCES	41
APPENDIX B: CONTRIBUTORS	53
APPENDIX C: DATA FROM FIRST TRYOUTS	57

THE FIVE PHASES ARE:

PHASE I ANALYZE

Inputs, processes, and outputs in Phase I are all based on job information. An inventory of job tasks is compiled and divided into two groups: tasks not selected for instruction and tasks selected for instruction. Performance standards for tasks selected for instruction are determined by interview or observation at job sites and verified by subject matter experts. The analysis of existing course documentation is done to determine if all or portions of the analysis phase and other phases have already been done by someone else following the ISD guidelines. As a final analysis phase step, the list of tasks selected for instruction is analyzed for the most suitable instructional setting for each task.

PHASE II DESIGN

Beginning with Phase II, the ISD model is concerned with designing instruction using the job analysis information from Phase I. The first step is the conversion of each task selected for training into a terminal learning objective. Each terminal learning objective is then analyzed to determine learning objectives and learning steps necessary for mastery of the terminal learning objective. Tests are designed to match the learning objectives. A sample of students is tested to insure that their entry behaviors match the level of learning analysis. Finally, a sequence of instruction is designed for the learning objectives.

PHASE III DEVELOP

The instructional development phase begins with the classification of learning objectives by learning category so as to identify learning guidelines necessary for optimum learning to take place. Determining how instruction is to be packaged and presented to the student is accomplished through a media selection process which takes into account such factors as learning category and guideline, media characteristics, training setting criteria, and costs. Instructional management plans are developed to allocate and manage all resources for conducting instruction. Instructional materials are selected or developed and tried out. When materials have been validated on the basis of empirical data obtained from groups of typical students, the course is ready for implementation.

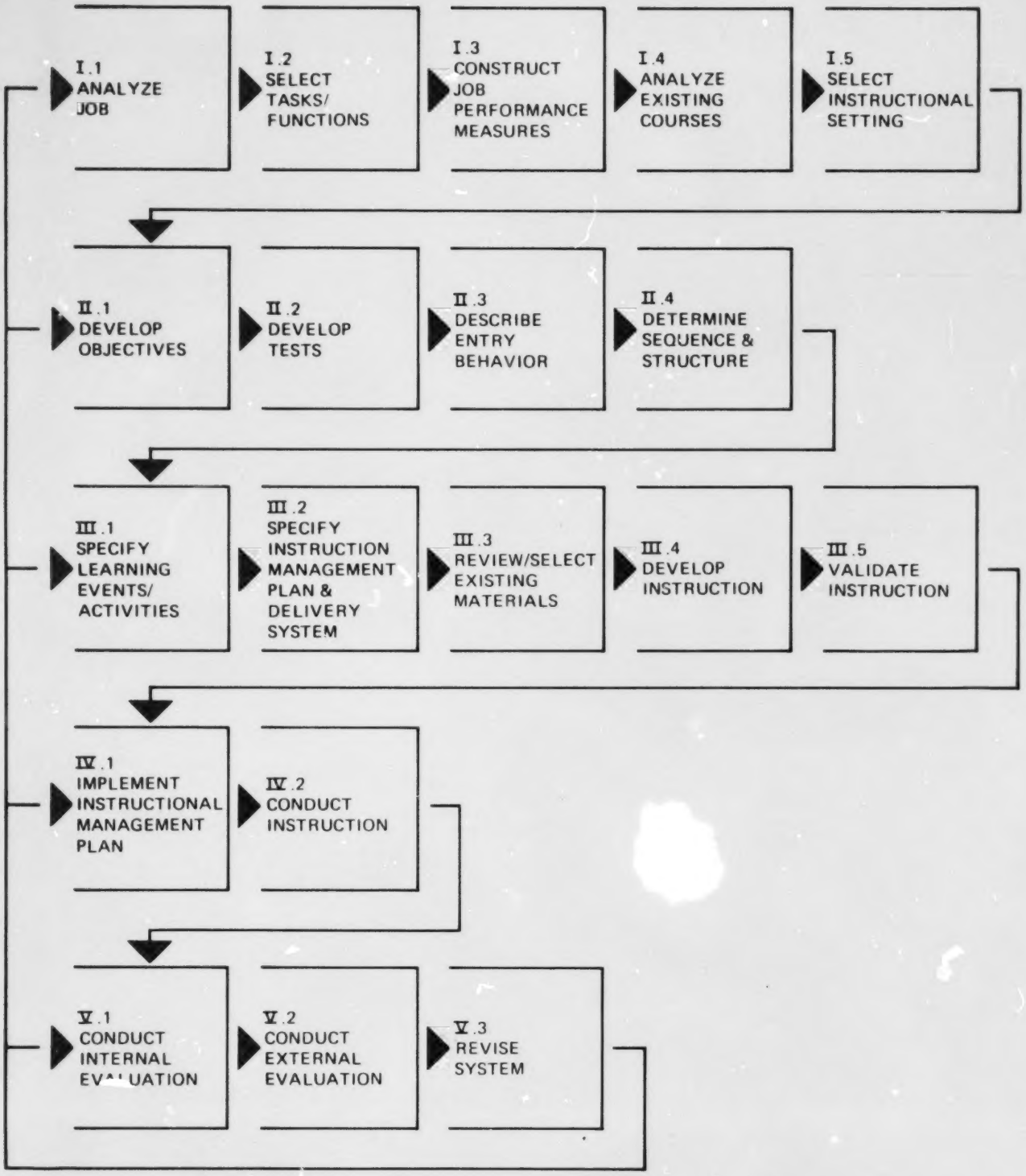
PHASE IV IMPLEMENT

Staff training is required for the implementation of the instructional management plan and the instruction. Some key personnel must be trained to be managers in the specified management plan. The instructional staff must be trained to conduct the instruction and collect evaluative data on all of the instructional components. At the completion of each instructional cycle, management staff should be able to use the collected information to improve the instructional system.

PHASE V CONTROL

Evaluation and revision of instruction are carried out by personnel who preferably are neither the instructional designers nor the managers of the course under study. The first activity (internal evaluation) is the analysis of learner performance in the course to determine instances of deficient or irrelevant instruction. The evaluation team then suggests solutions for the problems. In the external evaluation, personnel assess job task performance on the job to determine the actual performance of course graduates and other job incumbents. All collected data, internal and external, can be used as quality control on instruction and as input to any phase of the system for revision.

THE BLOCKS IN EACH PHASE ARE:


I.1 ANALYZE JOB
I.2 SELECT TASKS/ FUNCTIONS
I.3 CONSTRUCT JOB PERFORMANCE MEASURES
I.4 ANALYZE EXISTING COURSES
I.5 SELECT INSTRUCTIONAL SETTING
II.1 DEVELOP OBJECTIVES
II.2 DEVELOP TESTS
II.3 DESCRIBE ENTRY BEHAVIOR
II.4 DETERMINE SEQUENCE & STRUCTURE
III.1 SPECIFY LEARNING EVENTS/ ACTIVITIES
III.2 SPECIFY INSTRUCTION MANAGEMENT PLAN & DELIVERY SYSTEM
III.3 REVIEW/SELECT EXISTING MATERIALS
III.4 DEVELOP INSTRUCTION
III.5 VALIDATE INSTRUCTION
IV.1 IMPLEMENT INSTRUCTIONAL MANAGEMENT PLAN
IV.2 CONDUCT INSTRUCTION
V.1 CONDUCT INTERNAL EVALUATION
V.2 CONDUCT EXTERNAL EVALUATION
V.3 REVISE SYSTEM

THE OUTCOMES OF THE BLOCKS ARE:

I

- **.1** . . . a list of tasks performed in a particular job.
- **.2** . . . a list of tasks selected for training.
- **.3** . . . a job performance measure for each task selected for instruction.
- **.4** . . . an analysis of the job analysis, task selection, and performance measure construction for any existing instruction to determine if these courses are usable in whole or in part.
- **.5** . . . selection of the instructional setting for task selected for instruction.

II

- **.1** . . . a learning objective for and a learning analysis of each task selected for instruction.
- **.2** . . . test items to measure each learning objective.
- **.3** . . . a test of entry behaviors to see if the original assumptions were correct.
- **.4** . . . the sequencing of all dependent tasks.

III

- **.1** . . . the classification of learning objectives by learning category and the identification of appropriate learning guidelines.
- **.2** . . . the media selections for instructional development and the instructional management plan for conducting the instruction.
- **.3** . . . the analysis of packages of any existing instruction that meets the given learning objectives.
- **.4** . . . the development of instruction for all learning objectives where existing materials are not available.
- **.5** . . . field tested and revised instructional materials.

IV

- **.1** . . . documents containing information on time, space, student and instructional resources, and staff trained to conduct the instruction.
- **.2** . . . a completed cycle of instruction with information needed to improve it for the succeeding cycle.

V

- **.1** . . . data on instructional effectiveness.
- **.2** . . . data on job performance in the field.
- **.3** . . . instructional system revised on basis of empirical data.

EXECUTIVE SUMMARY

The U.S. Armed Forces have always been dedicated to the maintenance of ready and able forces to meet all expected threats. Today with rapidly expanding technology and a more widespread distribution of knowledge and resources throughout the world, it often takes a double effort simply to maintain optimal readiness. There are current indications that success in future military confrontations will require a strong immediate first strike capability.

One prime element in battlefield performance is properly trained personnel. The continuing process of improving current training systems through identifying the most successful instructional technologies is an integral part of effective training efforts. Utilizing the best, established approaches to the analysis, design and development of instruction may well represent the optimum methodology for insuring the maintenance of a well-qualified military force. And, with increasing emphasis on cost efficiency in all military endeavors and decreasing defense budgets, there is understandable widespread interest in deriving the maximum benefit possible from every dollar devoted to the training effort.

In an attempt to establish economical and effective training programs to meet the new and changing demands of all military services, the commanders of the four services met in September of 1972 in Washington to establish themselves as the Interservice Training Review Board. The Board hoped to realize economy in training through the consolidation of training. To effect this mission, a number of subcommittees constituting the Interservice Training Review Organization (ITRO) were formed.

The ITRO operated on the principle that any effort in the direction of consolidating the training approaches of the four services would yield a wide range of potential economies in manpower and financial resources. One of these subcommittees, the Interservice Committee for Instructional Systems Development, was ultimately charged with the task of producing a process for instructional systems development which could serve as the model for any interservice curriculum development activity.

During this same time period, the U.S. Army, through the Combat Arms Training Board (CATB) at Ft. Benning, Ga., had undertaken an effort to improve systematically the training in the combat arms and ultimately in the entire Army. One aspect of that effort was an analysis of the state-of-the-art in Army training and a set of recommendations to be followed to close the gap between what was found and what was possible.

Following the study, CATB concluded that one important missing element was a set of procedures which would allow for the development of effective training and a means to assess the effectiveness of training. This study, Task I of Contract N61339-73-C-0150, was conducted by the Center for Educational Technology at Florida State University to assess the state-of-the-art of training technology, identify concepts appropriate to the mission of TRADOC schools and training centers, and recommend methods for institutionalizing these concepts within the TRADOC School and Training Center System.

Developments in instructional technologies during the last decade have been significant and widespread. Historically, the majority of instruction was delivered via the chalk and talk technique, but advances in hardware/software development of instructional materials have led to

the examination of alternative approaches to designing, developing and delivering instruction.

Of all the advances in instructional technology that have had an impact on the military and industrial training establishments probably the most important is the Systems Approach to Training (SAT). Instructional Systems Development (ISD) is one specific application of SAT. These techniques ensure the development of efficient and effective instruction and, most notably, instruction that achieves pre-defined objectives. In short, the development of instruction based on ISD principles provides instruction that works.

Based on a large number of successful demonstrations, there is now empirical evidence that competent use of the ISD approach can greatly improve training in at least three distinct ways:

1. Training <u>effectiveness</u> can be greatly increased through the use of ISD procedures. These design and development procedures allow for a careful selection of what is to be trained, the measurement and evaluation of the training, and the revision of the training program until the objectives are met.
2. The application of ISD procedures to instruction can have great pay-offs in <u>efficiency</u>. Several military applications of ISD have indicated that effective instruction can be offered in a more time-efficient manner than has been true in the past.
3. Although the use of ISD procedures will not always result in the lower costs, they do provide a systematic way of viewing <u>costs</u> of training and considering whether additional resources are justified in view of the output.

The ISD procedures as described in TRADOC Pam 350-30 (1975) constitute guidelines for developing instruction which are based on the most current state-of-the-art in instructional technology. The Interservice Procedures for Instructional Systems Development (IPISD) consist of a set of manuals for use as guidance in military ISD applications. A series of workshops designed to teach the procedures to all levels of personnel who will be involved in these efforts were validated in several trials conducted over a two year period in the Army and Navy.

When used as intended, in conjunction with existing regulations, methodologies, and local needs, these procedures greatly increase the likelihood of high quality instruction with pay-offs in terms of effectiveness, efficiency and/or costs. Widespread application of ISD should greatly improve the capabilities of the military services in the future.

INSTRUCTIONAL SYSTEMS DEVELOPMENT

Bases for ISD

Instructional Systems Development (ISD) has grown out of basic research in three separate areas: management sciences, communication sciences, and behavioral sciences. Examples of basic research areas in the management sciences include: job analysis, occupational survey techniques, decision theory, cost effectiveness models, and computer technology.

From the communications sciences, research in communication electronics and media utilization have produced a wide variety of alternative techniques and procedures for accomplishing instructional objectives.

There are three important areas of research in the behavioral sciences which have yielded results that are useful in ISD. Learning research has provided a solid foundation for the design of alternative approaches to instruction. Measurement and evaluation of behavior has matured to the point that it is possible to have great confidence in the measurement and evaluation procedures. And, the recent past has seen a large variety of instructional design and management approaches which have yielded impressive results.

These contributions from the management, communication, and behavioral sciences allow for the development of ISD technology. The ISD process includes the capability for specific research and development to resolve existing problems. In addition, because it provides for so many alternatives to traditional forms of instruction, the ISD process allows for the analysis and use of existing research bases.

Systems Approach to Training

Systems engineering, SAT, or ISD, all address what is essentially the same phenomenon; instruction that is planned to meet pre-defined objectives and then is continuously revised until these objectives are met. The key concept is planning which involves the accurate identification of the requirements and problems, the setting of specific performance objectives, the application of logic and analysis techniques to the problems, and the vigorous measurement of results in comparison to the specific performance objectives.

Instructional systems development, is an empirical methodology for the analysis, design, development, quality control and quality assurance of training systems. Following SAT ensures that instructional design decisions are based on an analysis of actual performance or "real world" data. The approach provides for development of instruction that effectively meets a need as opposed to "hit and miss" approaches that are usually haphazard at best.

In the overall management system context, the design and development of instruction necessarily must follow an adequate needs analysis. (See Figure 1.)

In this context, the term "need" refers to a measurable discrepancy or gap between what now exists and what is intended to exist. Needs analysis must accurately reflect the world or system as it now is and must also define clearly the most desirable state of affairs. Discrepancies can be created through the discovery of new knowledge or the application of new technology; e.g., the availability of a new weapons system or through changes in the force structure brought about by changes in strategy,

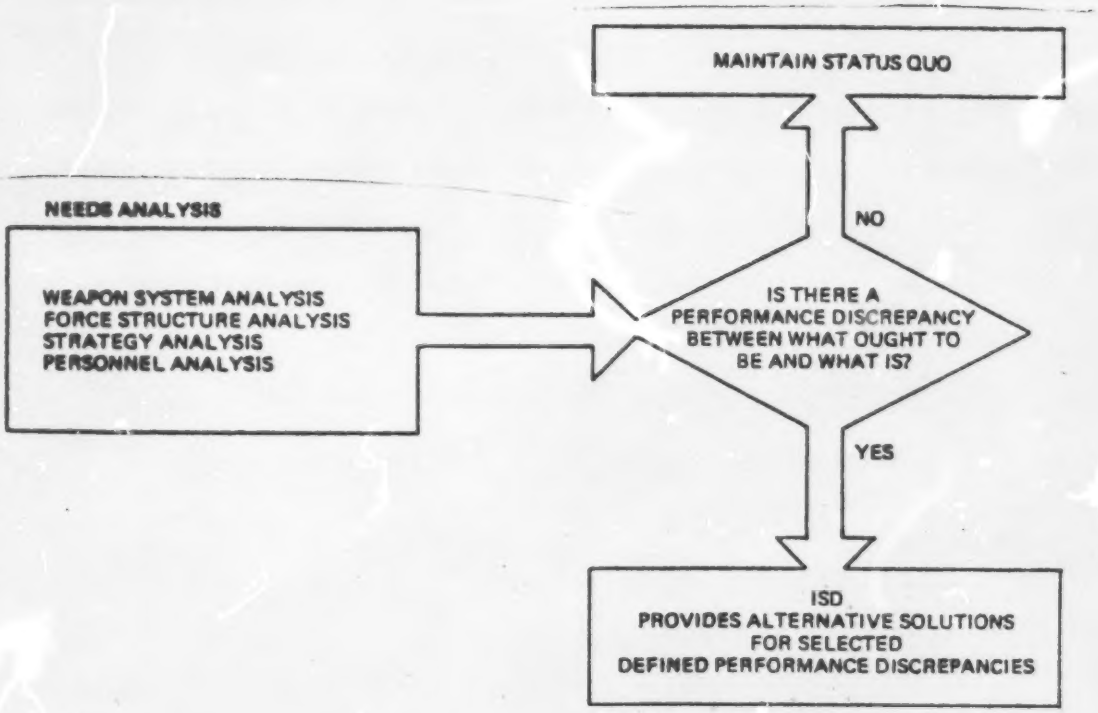


FIGURE 1: Relationship of ISD to Total System

tactics, or changes in the military personnel system. For example, in the early 1970's, the reenlistment rate of combat experienced veterans remained at a moderate to low level. During the middle 1970's, perhaps as a result of the general economic conditions or wide scale national attitudinal changes, combat veterans were reenlisting at a dramatically increased rate. Changes of this nature can have important implications for the training system as a whole.

How Does ISD Differ From Existing Practice

One way to indicate the difference between ISD and existing practices is to point out that there are currently a number of existing practices, some of which represent excellent applications of ISD. There are outstanding examples of well-conceived and delivered instruction available within the interservice training community. However, these efforts do not represent a very large fraction of the total interservice training establishment.

An important difference between ISD and more traditional forms of instruction is that the ISD process, through occupational surveys and job analyses requires the thoughtful selection of what is to be trained based on solid job data from the field. This practice tends to insure that training will be provided for those tasks most critical to adequate job performance, and that training will not be wasted on tasks which have a low probability of meeting immediate needs or critical long-term needs.

A second important difference between traditional schools and ISD procedures is the consideration of how training is to be conducted. The recent past has seen a number of innovations in approaches to training all of which are either as good as or better than traditional methodology. The generation and application of alternative training methodology is required in the ISD process; it is not assumed that all training will be platform instruction.

A third critical difference between traditional practice and ISD is the use of test data based on absolute standards of performance

and the use of that data to grade students and to judge the quality of the instruction. There are specific objectives that courses are planned to meet; ISD requires that courses be evaluated on their ability to meet those stated objectives, and be revised if they fail to do so.

Finally, the ISD process requires the application of modern technology to the fullest degree possible in order to optimize training effectiveness, efficiency and cost. Consideration is given to the relative value of training compared to its cost, and whether the output of the training system is worth the investment of time and resources required to produce that output. A unique feature which distinguishes ISD from more traditional approaches is that course time or cost reductions are brought about not by the elimination of content or the reduction of service but through the application of a technology to achieve expected performance with fewer resources. The application of unit cost and unit time reduction techniques have often produced dramatic results.

Potential Benefits of ISD

Based on a large number of successful demonstrations, there is now empirical evidence that competent use of the ISD approach can greatly improve training in terms of effectiveness, efficiency and/or costs. There have been many demonstrations that combinations of effectiveness, time-efficiency, and cost considerations have yielded impressive results, particularly when they have been considered in the context of making alternative investment decisions. Investments in technology for certain long high-flow courses have demonstrated improvements in cost

per student, time required to complete, and increased effectiveness. These results have been obtained on large systems which use advanced simulators and also in areas of training which use no hardware at all. The common element is the procedure and approach, not the hardware or equipment.

The ISD approach cannot be hailed as a new technology discovered by the contractor. In fact, each of the four services had been designing training programs using one of several systems approach models. What ISD provides that is unique is a high quality uniform approach to training that allows all units to achieve the same high level of quality from the training effort. It can be stated with confidence that the ISD package described later in this report, clearly represents the most current knowledge and methodology available in the field of instructional technology today.

The ISD model is based on the following nine assumptions:

1. The mission of a military instructional system is to determine instructional needs and priorities, to develop effective and efficient solutions to satisfying the needs, to implement the solutions in a competent manner, and to assess the degrees to which the output of the system meets the specified needs.
2. There are alternative approaches to the solution of instructional problems which are differentially responsive to specific environmental constraints found in the Armed Forces.
3. The existing large body of research and development in learning, instruction, and management techniques may provide the basis for significantly improved instruction.

4. A systems approach to the process and procedures of instruction is the most effective current means of evaluating, developing, and implementing these alternatives.
5. Regardless of the complexity of the job tasks to be performed, the instructional system should optimize the proportion of entering students who meet acceptable job task performance standards by the end of instruction.
6. Planned technical and management change in the operation of the instructional system will be a continuing requirement.
7. Individuals differ in their abilities, achievement, motivation and rate of learning and an instructional system must accomodate these differences to capitalize on the opportunity for increasing the effectiveness and efficiency of instruction.
8. Two or more equally successful alternative solutions can be found for any instructional problem, and these solutions will differ in cost.
9. Intensive and recurring training of managers and instructional developers in the application of The Interservice Procedures for Instructional Systems Development (IPISD) represents a direct first step toward achievement of this mission.

The Interservice Procedures for Instructional Systems Development are concerned primarily with the "how to do it" aspects of instructional systems development. Based on the preceeding assumptions, the IPISD manuals and adjunct materials are designed to describe the functions and provide the guidelines necessary to analyze instructional needs;

design, develop, and implement instruction; and insure quality control of instruction.

The five phase ISD Model as developed by the Center for Educational Technology provides an integrated approach to training. Each phase (Analyze, Design, Develop, Implement, and Control) is intended to yield the necessary information and data to produce an effective training package. An outline of the model and its outputs is provided in the fold-out at the front of this report. The IPISD Package section contains a complete description of the entire IPISD package and gives suggestions for its use.

CONTRACT HISTORY

Task I

On 29 May 1973, a contract was entered into between the Center for Educational Technology and the U.S. Army Combat Arms Training Board (Contract No. N61339-73-C-0150). Task I of this contract involved the analysis and assessment of the state-of-the-art in training technology and the application of the concepts identified in the analysis to the current mission of the TRADOC School system.

The Task I Report (Analysis and Assessment of the State-of-the-Art in Instructional Technology) defined training technology (instructional technology), described the current usage of the products and processes associated with instructional technology, assessed the value or potential value of these products and processes, described exemplary programs utilizing these products or processes from the Army and the other services, and made a series of recommendations based on the analysis and assessment of the products and processes then in the use in TRADOC Schools and Training Centers.

The recommendations were:

a) Train selected TRADOC School military and civilian personnel in those areas of instructional design where they will have a specific need for these knowledges and skills according to their assignments;

b) Train all middle management personnel in an overview of instructional development and extensive instruction in the management of empirically designed instruction with important emphasis on quality control procedures and the benefits of using alternative instructional models;

c) Train all Assistant Commandants and department heads in quality control procedures, the general purpose of ISD, the potential benefits of using alternative instructional approaches, methods of measuring and estimating cost-effectiveness, and other topics which are relevant to the needs of senior managers;

d) Establish a clear cut procedure based on research, for the development, validation, and determination of critical tasks. This should include emphasis on the prioritizing of critical tasks and the elimination of unnecessary training;

e) Study and establish a new method for determining staffing levels at TRADOC Schools. The platform hours staffing model does not serve other forms of instruction as well. If an instructional alternative is used which does not provide for platform instruction, it may well work against the staffing level of the school.

f) Develop procedures for determining relevant, clear, job performance evaluation instruments for real world performance objectives.

g) Develop a dissemination model and an orderly procedure for implementing empirically designed instruction procedures throughout the TRADOC School and Training Center System.

h) Analyze the various instructional settings currently in use in order to determine the function of each in the total training program and to eliminate redundant instruction wherever feasible and possible. This would also include an analysis of the purpose and function of the departments responsible for resident and non-resident instruction.

The initial research for this task had led to a further contractural agreement to prepare and validate a training package to develop in Army personnel the skills necessary to enable them to design, develop and use empirically designed instruction (Task V). Although there was a large selection of instructional materials available from various commercial and military sectors which address components of ISD such as task analyses, specification of objectives and evaluation, these materials were neither complete nor homogeneous enough to train military personnel in instructional systems development. The need for this effort was specifically

identified in the course of the Task I research and incorporated into the previously stated recommendations.

TRADOC Regulation 350-100-1

In addition to the recommendations made by the contractor in the Task I report, consideration was given to recommendations made in the 1970 HumRRO Report Review of the CONARC Systems Engineering of Training Program at the United States Army Aviation School (Ricketson, Schulz, & Wright). HumRRO's Division No. 6 had made a review of TRADOC Reg 350-100-1, the Army's principal source of guidance on systems engineering of training, and its implementation at the Aviation School. This review generated the following recommendations for revising the regulation. The regulation itself should:

a) Be systems engineered to reflect an organization that clearly identifies the systems engineering elements of work (products/subproducts) and the required flow of information (inputs/outputs) between them.

b) Fully state procedures indicating how the systems engineering work is to be accomplished, as well as what work is to be accomplished where such information does not exist in the literature (otherwise, such literature should be cited).

c) Should require documentation of the "ideal" training program before compromises are made due to time and resource limitations.

d) Should make provisions, where necessary, for systematically reviewing, validating, and approving systems engineering program products/subproducts by personnel fully aware of the nature and purpose of the program.

e) Should, in defining tasks for job and training analysis, remove the restriction to tangible objects so that tasks involving intangible factors will not be excluded.

f) Should further analyze tasks, among those not selected for school training for which uncertainty exists regarding the correctness of their disposition, to verify that no requirements exist for them to be school trained.

g) Should orient training quality control more toward the use of field performance data, and provide systematic procedures for feeding corrective actions back into the training program.

h) Should reorient the procedural guidance for test construction toward distinguishing between minimally acceptable and unacceptable job entry level students.

The suggestions were expressed by both the users of 350-100-1 and those who had worked on its development. In addition to the recommendations on the systems engineering procedures, they also made recommendations for training and managing the users:

a) Education Advisors qualified in systems engineering of training be added to the Systems Engineering Program (SEP) in numbers sufficient to provide Curriculum Development Groups (CDGs) with the technical systems engineering guidance required on a day-to-day basis.

b) Policies for assignment of personnel to CDGs should be established, assuring sufficient levels of both field and instructional experience within each CDG.

c) Personnel turnover problems should be decreased by requiring long-term assignments for senior level personnel, which will maintain continuity within each CDG.

d) Systems engineering and training technology references should be made readily available to each CDG establishing a library of these materials in the CDGs' location at each participating school.

e) USCONARC support of the SEP should be improved by providing close expert systems engineering guidance to SEP administrators and Education Advisors, and by scheduling regular meetings with them to discuss SEP progress.

f) Since CDG knowledge and experience in the mechanics of training technology is highly limited, CDGs should have access to the specialized training expertise required to accomplish the SEP milestone at hand.

The information contained in this report provided valuable inputs for the contractor's development of ISD procedures to replace TRADOC Reg 350-100-1. The specific goal of CET was to develop a model and then a set of training procedures to represent the most current knowledge, techniques, and methodologies to be followed in the development and conduct of training. In addition to the development of a multi-volume set of procedural manuals and mediated materials to accompany them, workshops for senior managers, supervisory personnel and technical level workers on how to utilize the procedures embodied in the manuals were to be developed.

Recognizing that systems designed instruction requires different instructional management procedures than traditional instruction, a management plan for ISD was also to be developed by the contractor. Finally, CET and CATB personnel were to study the doctrine and regulations related to instruction to determine what changes would be necessary to support an ISD system and to make specific recommendations based on this study.

The Interservice Committee

Of significant impact to the contractual relationship between the contractor and CATB was the broadening of the project's scope to include all four services. In June of 1973, the Interservice Training Review Board established a subcommittee on terminology which was charged with the development of a glossary of terms and an interservice approach to instructional systems design. The subcommittee subsequently decided that the interservice ISD problem was most immediate and they agreed at their June meeting to act as monitor and supervisor of the work being done at CET for CATB. This subcommittee became the Interservice Committee for Instructional Systems Development.

The new orientation of the CET/CATB project was officially approved at a 26 July 1973 meeting at Ft. Benning, Georgia attended by members of the Interservice Committee, CATB and TRADOC representatives and contractor personnel. It was agreed that CATB would remain the party to which Florida State would be directly responsible, with CATB assisting in the coordination of the four services. The participation of the ISD committee would include provision of initial materials and insights, and periodic review of contractor activities to insure the products developed would meet the requirements of all of the services involved.

The Model

ISD procedures offer the military community the benefits of utilizing one common approach and terminology in the conduct of interservice training; benefits which will produce valuable savings in time required to train, the elimination of unnecessary duplication of training programs, and on the whole, a more efficient and effective training system.

On 6 September 1973, final approval was granted for CET to begin the initial work on the development of the manuals and workshop materials. The first step was the formulation of the ISD Model design. During the next six months the contractor devised a model which went through several elaborations and changes both in format and terminology. After extensive discussions, agreement was reached on the title Instructional Systems Development (ISD), the names of the phases and the blocks, and the sequence of those blocks.

Resources and Review

To insure that the doctrine in the IPISD manuals was the latest and most relevant knowledge available in the area of instructional systems,

the contractor solicited a large number of documents on various instructional technology topics from the service. These documents are listed as references in the IPISD Executive Summary and are appended as Appendix A of this report. The ISD manuals are based on documents from diverse sources such as Air Force Regulation 50-58, TRADOC Reg 350-100-1, and on-the-job analysis work done by Raymond Christal at Air Force Human Resources Lab. The examples used in the materials came from all four services, as did the concepts and forms.

Many civilian documents in the field were reviewed and considered, however, copyright problems precluded their incorporation into the manuals. Requiring the purchase of specific additional commercial publications was also considered a potential problem area; therefore, those commercially available books which were considered to be of value as reference material were included as suggested references (see Appendix A), but were not made an integral part of the manuals or workshops. Adjunct materials were limited to those developed by the four services.

The development of the model, manuals and workshops was an iterative process. Since the IPISD model, manuals and workshops were intended to serve the varied needs of the interservice community it was essential to obtain opinions and revision suggestions from a wide range of experts. Many people from FSU, CATB, the TRADOC Schools, Chief of Naval Education and Training (CNET), Chief of Naval Education and Training Support (CNETS), Chief of Naval Technical Training (CNTT), the Air Force, the Marines and the civilian sector made contributions at all stages. (See Appendix B.) They contributed directly by writing sections, providing critiques, reviewing materials, giving alternatives, examples, exercises, and providing existing resources.

Content Validity

The first approach tried to achieve content validity involved submitting first drafts of a summary to numerous civilian and military experts to obtain consensus on the doctrine to be contained in the IPISD Manuals. The experts did not feel the summary contained sufficient instructional material to use as a basis for valid recommendations. Therefore, after obtaining consensus on the model, the approach was changed to a review of the draft of the complete set of manuals. Following the review, which involved experts and schools from all four services, the manuals and workshop materials went through an extensive formative evaluation.

Formative Evaluation

The process of formative evaluation seeks to gather information upon which revisions to instructional products can be based. Two classes of data were gathered in each field trial; performance data and rating or attitudinal data. Performance data was obtained through the administration of a pre and posttest, and through the evaluation of workbook exercises completed by the participants. The attitudinal data was collected by having each participant fill out a short rating scale after each of the reading assignments, presentations, mediated materials and workbook exercises. Participants were also encouraged to write additional comments directly on the rating scale and on the workbooks or in the manuals. Performance and attitudinal data were later analyzed in order to determine where appropriate revisions were necessary.

The following is a summary of the field trials and reviews of the IPISD material.

Phases I and II Individual Trials at Florida State University, September 1974: Four members of the target population were selected for a one week trial of Phases I and II and the workbook at Florida State University. One was already a systems engineering expert and was redirected to critique the manuals and exercises rather than try them. One participant became ill and left immediately. The remaining two did so well on the exercise that there was little error data to base revisions on.

Phases I and II Tryouts at Ft. Benning, Ga., 4-8 November 1974: A large group tryout of the IPISD Phase I and II Manuals and workbook was conducted at Ft. Benning, Ga., with 28 participants and 12 enablers and workshop directors. Extensive records were kept of performance and attitude measures. Excerpts from these data are contained in Appendix C of this report. These measures formed one of the bases for extensive revisions of the exercises and later revisions of the manuals. The revisions ranged from correcting typos and adding examples t changes in doctrine.

Interviews with School People for First Managers Workshop, November, 1974: Selected participants who scored high on the ISD pretest or had extensive systems engineering experience in the Phase I and II tryout were interviewed prior to preparing an initial description of what personnel at the managers level needed to know about ISD. Their comments and suggestions, along with inputs from the ISD development and the CATB staffs, became one of the inputs to the first iteration of the Managers Workshop.

Trials of Selected ISD Blocks From Phases I and II For TEC IV Schools Personnel at Ft. Benning, Ga., January 1975: ISD Blocks I.1, I.2, I.3, II.1, II.2, and II.3 were bound together and given to the TEC IV School personnel for use in a workshop on conducting job analyses and selecting tasks for Army Training Extension Courses (TEC).

Managers Workshop Trial at San Diego, Ca., February 1975: The workshop trial consisted of several handouts and presentations, some discussion sessions and an exercise. Half-day sessions were held each day for a week. Some participants attended all sessions, some only one. The ISD slide/tape was shown but the manuals were to be read by the participants on their own time.

The participants made several suggestions for revision of the workshops. They said there was little time for them to study the manuals and they would have preferred that the presentations include more about the mechanics of ISD rather than the philosophy. They also wanted more exercises and felt strongly that the week should be devoted 100% to the workshop at a site away from the office.

Second Trial of Phases I and II and First Trial and Phases III, IV, and V at the Naval Training Center, San Diego, Ca., February 1975: The participants in the Navy trial were principally E5s and E6s who were beginning the instructor training course at San Diego. They provided not only important data for revision of the manuals and exercises, but "time required" estimates and a basis for revising the management of the workshop.

Staffing, Spring 1975: After the San Diego trial the manuals were revised and Phases III, IV, and V were sent to all TRADOC schools and selected Navy experts for staffing. Most schools responded to the CATB request for review, critique and/or revision suggestions. These suggestions along with further inputs from outside experts and the trial results were incorporated in the current version of the IPISD Manuals.

Executive Summary and Model, July 1975: In addition to using the revision suggestions and critiques for the manuals, these changes plus some needs expressed by participants in the Managers Workshop were summarized in a single manual to be used principally by ISD managers.

Delivery, August 1975: The final version of the Interservice Procedures for Instructional Systems Development package, Phase I-V Manuals, Executive Summary, and the ISD slide/tape, were delivered to CATB for printing and distribution. The entire set of manuals has been published with the military identification numbers of TRADOC Reg 350-30 (Army) and NAVEDTRA 106A (Navy).

Validation Trial at Ft. Gordon, Ga., September 1975: A trial of the combined technical level and management workshops for managers from three Army schools was conducted at the U.S. Army Signal School, Ft. Gordon, Ga. Since the manuals had been published no further changes were made in them. However, both the Technical Level Workshop and the Managers Workshop were revised based on this trial.

Validation Trial at Florida State University, October-November 1975: A month long trial of the Technical and Managers Workshop for managers from Army and Navy schools was conducted as part of another contract. Further revisions were made in the both workshops as a result of this trial.

Delivery of Technical Level Workshop and Directors Guide, November 1975: The validated workshop materials were delivered to CATB following revision of the workshop exercises and completion of the Workshop Directors Guide.

Delivery of Senior Managers Workshop, Pensacola, Fl., February 1976: The Senior Managers Workshop was not a "product", but consisted of two days of presentations, exercises, and critique. A full report of the workshop is contained in the Interservice Procedures Instructional Systems Development (IPISD) Senior Managers Workshop: Final Report (May 1976).

Delivery of Managers Workshop and Directors Guide, August 1976: The validated workshop materials and Workshop Directors Guide were delivered following revisions.

IPISD PACKAGE

The Interservice Procedures for Instructional Systems Development (IPISD) package contains a number of components necessary for the training of personnel involved in interservice curriculum development. The materials in the IPISD package can be combined in a number of ways for different training and implementation purposes. The materials can be used in either individual study or group study format and have been designed to accommodate a variety of learner and instructional requirements. The IPISD Manuals themselves have been designed to provide information and guidance to personnel involved in the ISD process.

The Manuals

The five volume set of IPISD Manuals represents the latest knowledge and procedural methodologies available in the field of instructional systems development. The manuals are a compendium of training technology practices resulting from a comprehensive search, review and evaluation of existing documents from private, commercial and military sources.

The volume titled Executive Summary and Model provides a basic summary and review of the entire set of manuals and accompanying adjunct materials. Each block of the ISD Model is outlined with inputs, processes, and outputs identified. Management decisions inherent in applying specific ISD principles are elaborated upon, as are the initiatives necessary to implement IPISD within local commands. This volume is used in the Managers Level Workshop which is discussed later in this report. It provides necessary information for personnel involved in the management of ISD efforts at both the middle and senior managers level.

The other four volumes of the IPISD Manuals comprise the main component of the IPISD package. The manuals contain the "how to do it" information necessary for the conduct of ISD activities by technical level personnel and are the basis for training provided in the Technical Level Workshop which will be described more fully later. The manuals also serve as guidance and reference documents for information on ISD training doctrine.

These four volumes are divided into five phases and each phase is further broken down into several "blocks." (See foldout at front of this report.)

Phase I: ANALYZE presents procedures for defining what jobs are, breaking these down into statements of tasks, and using numerical techniques to combine the best judgment of experienced professionals to select tasks for training. Phase I also presents processes for construction of job performance measures and the sharing of occupational and training information within and among the services. It provides a rationale for deciding whether tasks should be trained in schools, on the job, or elsewhere, and also requires consideration of the interaction between training and career progression.

Phase II: DESIGN deals specifically with the design aspects of the training program within selected settings. "Design" here is considered in the architectural sense in which the form and specifications for training are laid down in careful detail. Phase II reviews the considerations relating to entry behavior of two separate kinds: general ability and prior experience. A rationale is presented for establishing requirements based on the realistic evaluation of both of these factors.

Phase III: DEVELOP refers to the actual preparation of instruction. Determinations are made about how the students shall be managed, the kinds of learning experiences they will have, the activities in which they will engage, and the form and content of the instructional delivery system. Techniques are presented for the careful review and adaptation of existing materials. Procedures for the systematic design of instruction which can be delivered in a variety of media are also included. Phase III terminates with a carefully developed procedure for testing and evaluating the instruction to insure that its performance meets expectations.

Phase IV: IMPLEMENT specifically treats the necessary steps to implement the instruction according to the plan developed in Phase III. Two important steps highlight Phase IV, that of training the staff in the procedures and problems unique to the specific instruction and actually bringing the instruction on-line and operating it. The Phase IV effort continues as long as there is a need for the instruction.

Phase V: CONTROL deals with procedures and techniques for maintaining instructional quality control standards and for providing data from internal and external sources upon which revision decisions can be based. Data collection, evaluation of the data, and decision making about the implications of the data represent the three principal functions described in Phase V. Emphasis is placed on the importance of determining whether the trainees are learning what was intended, and upon determining whether what they have learned is of the expected benefit to the receiving command. A negative answer to either of these would suggest revisions in the content or procedures in order to make the instruction meet the need it is intended to serve.

The Workshops

Since the manuals were not designed for use by novices, training programs are provided for both users and their supervisors through the IPISD Workshops. The recommended implementation plan is for an individual to first attend one of three workshops, appropriate to his position, with a group of other trainees. The workshop provides the participant with specialized instruction on each phase of IPISD and peripheral concepts necessary to understanding the operation and implementation of IPISD. The participant also learns how to access the considerable information contained in the IPISD manuals, how to use existing referenced Armed Forces publications, and how to continue to improve and develop additional skills pertinent to the design, development and evaluation of instruction.

Technical Level Workshop: The instructional workshop is the key vehicle for training students in the application of concepts and procedures described in the manuals, and is an integral part of practical instruction in the use of IPISD. The Technical Level Workshop is designed for individuals who are directly involved in the actual design and development of instruction. Within the context of the workshop setting, the manuals are used in conjunction with the student workbook which contains practical exercises offering the student the opportunity to actually apply the procedures outlined in the manuals.

The workshop consists of 12 modules, each related to different portions of the IPISD Manuals:

Module 1	Module 5	Module 9
Block I.1	Block II.1	Block III.3
Block I.2	Block II.2	Block III.4

Module 2:	Module 6:	Module 10:
Block I.3	Block II.3 Block II.4	Block III.5
Module 3:	**Module 7:**	**Module 11:**
Block I.4	Block III.1	Block IV.1 Block IV.2
Module 4:	**Module 8:**	**Module 12:**
Block I.5	Block III.2	Block V.1 lock V.2 Block V.3

The initial exercises in each module are based on a sample school product, with feedback following completion of these exercises. The final exercise(s) require the preparation of a product specific to the student's local school or MOS. In this fashion each exercise builds on the preceding ones as the student proceeds through the workshop, and the frequent feedback checkpoints provide a careful monitoring system to insure that problem areas or questions are identified as they occur.

Used in conjunction with the workshop, the manuals afford the students an opportunity to become thoroughly familiar with the doctrine in the manuals as well as to apply IPISD concepts in various exercises and student products. The student is also encouraged to use Technical Manuals (TMs) and other information related to his specific job in the development of workshop exercises and products.

The manuals and workshop have been designed to be used on a completely self-paced basis; students can proceed through either all or part of each phase according to their interests, needs, or job functions. However, the optimal approach is for students to use these materials in a group environment where they receive guidance and assistance on ISD principles. Within a

workshop setting, local requirements may best be served by sending individuals through those blocks most directly related to their job assignments. The use of student profile/job profile forms serves the function of assessing students needs for the purpose of assigning them to appropriate modules in the IPISD Manuals and Workshops respectively. It is the Workshop Director's responsibility to identify, based on student questionnaires and job profile forms, the level of competence a student should achieve on each IPISD phase. If the information contained in any one phase is only of peripheral relevance to an individual's job performance, then the requirements on that module should be minimal. For example, if an individual's main job responsibility is job/task analysis, then depending upon time and resource constraints, it may be preferable to send that person only through the Phase I Manual and related workshop activities and then provide them with an overview of the other IPISD phases. If, an individual's main job performance is concentrated in one area such as evaluation, but detailed knowledge of other phases is necessary for adequate job performance, the workshop activities can be geared to his specific needs.

The Workshop Director's Guide (WDG) for the Technical Level Workshop contains information on workshop management procedures and methodology, copies of forms and workshop pre and posttest for assessing student placement and progress through the modules, test scoring keys, and feedback and sample answers for use in evaluating students responses and products. The WDG comprises, in short, the principal document required for the conduct and successful operation of the Technical Level Workshop. In addition to the copies of materials needed for workshop participants, are specific instructions as to the roles of workshop personnel the

Workshop Director and the Enablers. All Workshop Directors should be thoroughly familiar with this document before conducting any workshop.

Directly related to the management of each block of the ISD Model is a multiple choice pre/posttest. These tests serve as a "checkpoint" to insure that students read the content of the manuals before starting the exercises. (Prior experience has shown that some students may attempt the exercises without reading the manuals. This may lead to serious problems when students are required to develop products which demand that they have synthesized a considerable amount of ISD information, which they may in fact have not acquired). Students are allowed to progress to the workshop exercises only after they have achieved the accepted criterion in the module posttest. The student also has the option of exempting reading any module by successfully achieving criterion performance on the pretest. In this instance, the student is given the module exercises after completing the pretest. Those who do not "pass" the pretest must read or reread the manuals and retake the test or discuss this problem with the Enabler.

An alternative to the self-paced management system is having a small group (four or five) go through each exercise with an Enabler. This approach has been tested several times in the Navy with excellent results both in terms of the student product and of student attitudes.

The Workshop Enablers perform an exceedingly important function as facilitators of student learning. Recognizing the importance of providing as much well qualified and direct feedback as possible, the Workshop Enabler should be an empathetic person, conversant in all phases of the IPISD Manuals and Technical Level Workshop. Indeed, one of the essential

elements to conducting a successful IPISD Workshop, and certainly conducting a large workshop, is the careful selection and training of Enablers. The Enablers must always be on hand to answer student questions, clarify content in the manuals, explain the correct procedures regarding the completion of exercises and, most important, evaluate student tests, exercises and products.

Enablers may be chosen from previous workshop participants who have demonstrated ability in grasping and applying ISD principles and who have had several months practical experience using IPISD or, individuals who are already knowledgable in general instructional design concepts may be trained in IPISD without actually having attended a workshop. In either case, those individuals who perform the function of Workshop Enabler should have a thorough in-depth understanding of ISD and most certainly they should be proponents of SAT.

In addition to the manuals and workshop exercises which form the required portion of any workshop, are a selection of various mediated presentations (AV or TV) which are employed on the basis of adding further understanding and background information to the ISD procedures.

1. "Tex". This slide/tape program developed by the Naval Instructional Technology Development Center, San Diego, California, presents a humorous anecdote on what an instructional technologist does in the process of managing instruction. Viewers find this tape very enjoyable and informative.

2. Needs Analysis. This one-half hour videotape program explains the concepts of needs analysis and briefly describes how a needs analysis may be performed. The needs analysis/assessment procedure occurs before the utilization of IPISD. This videotape was produced by CET for use in this workshop.

3. Performance Training. This videotape presents illustrated examples for both successful and unsuccessful approaches to the design of performance oriented training. This videotape, TF21-4526, was produced by the TV Division of the U.S. Army Transportation School in May 1972.

Managers Workshop: The Managers Workshop is designed for individuals who will be managing the work of technical level personnel in the performance of ISD duties and it is therefore expected that attendees of this workshop have previously participated in a Technical Workshop. It would also be beneficial if managers had practical experience in an ISD environment before attending the workshop.

Although workshop participants will work with the IPISD Manuals, the main emphasis of this workshop is oriented toward group process exercises and discussions designed to serve three purposes:

1. To increase the use and application of ISD concepts and rules,
2. to learn a method of extracting inputs from a variety of sources in group meetings, and
3. to shape attitudes toward systematic problem solving and ISD in particular.

These goals are largely achieved through seven practical exercises requiring the analysis of problems, the preparation of individual and/or group solutions, and the discussion of individual solutions. There are two types of exercises within the Managers Workshop: those that require evaluation of ISD products from technical level personnel and those that require analyzing ISD management problems.

Since the central compenent of the Managers Workshop largely revolves around the analysis and discussion of student products, the Workshop

Director should attempt to establish an atmosphere conducive to free flowing conversation. Groups should be limited to six participants to encourage as much interaction as possible.

In addition to the exercises, the workshop contains a number of readings and presentations on topics relevant to the management of IPISD. These include presentations on needs analysis, analyzing performance problems, job analysis, and readings on the U.S. Air Force Occupational Research Project, planning training settings, and vital signs in training management. The discussion periods which follow these workshop segments enhance the student's ability to analyze and synthesize the concepts presented.

As in the Technical Level Workshop, auxiliary materials are provided as additional inputs to the workshop content. These include:

1. "Tex". This slide/tape which outlines the activities of an instructional technologist is described on page 32 of this report.

2. A Techniques for Choosing Cost-Effective Instructional Delivery Systems (TAEG Report No. 16). This report prepared by the Training Analysis and Evaluation Group at the Naval Training Equipment Center, Orlando, Florida, presents a technique for choosing cost-effective instructional delivery systems for proposed training programs.

3. Analyzing Training Effectiveness (TRADOC Pam 71-8). This document describes TRADOC's methods for increasing effectiveness of selected combat material through improved training.

4. Instructional Systems Development (TF 6700) and Up with CRT (TF 6702). These films produced by the Aerospace Audiovisual Service as part of the Air Force Instructional Technology Series provide general information on ISD and criterion-referenced testing.

The Workshop Director's Guide (Managers Workshop) is the key document necessary for the management of this workshop. It includes organizational and administrative information for personnel directing a workshop as well

as school solutions and feedback for all exercises and an assortment of forms and questionnaires for workshop use. The equipment, facilities and personnel required for workshop operations are detailed, as is a suggested implementation plan for management of the workshop.

As in the Technical Level Workshop, Workshop Enablers make a significant contribution to the overall success of the Managers Workshop. A difference between the tasks of Enablers in the Technical and Managers Workshop is that Enablers in the Technical Workshop act more as instructors while those in the Managers Workshop act as group discussion leaders. Workshop Directors should ensure that Enablers possess effective group communication skills and are able to encourage and guide the direction of group discussion without being overly directive.

Senior Managers Workshop: The Senior Managers Workshop is composed of various presentations and discussions aimed at longer range management, planning, budgeting, and strategy considerations necessary for the IPISD training system. It lasts approximately two days and addresses such subject areas as performance analysis, needs analysis, management and reallocation of resources, cost analysis, and an overview of IPISD. There is one practical exercise associated with this workshop which presents a current real-world situation in which the adaptation of a new instructional technology has not met with expected success. The workshop participants are required to identify the problem and state why the application of ISD principles would, in fact, be effective.

IPISD Slide/Tape: The IPISD slide/tape program was designed to provide a guided overview of the entire ISD design, development, evaluation and implementation processes. In addition to the program are several military

examples of benefits which have been realized through various ISD applications to curriculum development. This 45-minute color production can be viewed in either small or large group setting and does not presuppose any knowledge of instructional systems design. It can be used as in introduction to or a summary of a workshop or as a stand alone briefing on IPISD.

SUMMARY

On August 18, 1975, the revised version of the IPISD Manuals was completed by the contractor and delivered to the Combat Arms Training Board. Results of various tryout efforts will be evaluated with the objective of gathering information from which future revisions can be made.

The interservice community now has available procedures which allow for the development of instruction following a validated systems approach format. IPISD represents the most current and innovative instructional technologies that exist today. Dedicated commitments by training units to apply these procedures in all training efforts is certain to make significant contributions to improving the efficiency and effectiveness of training.

Those unfamiliar with ISD procedures may balk at the rigor and dedication required to develop instruction following the ISD approach. There are however, countless examples of the efficiencies in training produced by just such techniques as are embodied in the IPISD Model. Honest effort, by persons engaged in the training endeavor, at applying these procedures to the development of instructional training systems is certain to produce high quality instruction. The payoffs for applying IPISD will be commensurate with the amount of effort expended. The contributions that the use of ISD can make toward the development and maintenance of a highly skilled military force are great and should be a major consideration in all implementation efforts.

APPENDIX A

REFERENCES

PHASE I

Block I.1

Christal, R. E. The United States Air Force Occupational Research Project. In The state of the art in occupational research and development. Symposium presented at the Navy Personnel Research and Development Center, San Diego, Calif., July 10-12, 1973.

Department of the Air Force. Handbook for designers of instructional systems: Task analysis (Vol. II, AFP 50-58). Washington, D. C.: Headquarters, United States Air Force, July 1973.

Tracey, W. R., Flynn, E. B., & Legere, C. L. J. The development of instructional systems: Procedures manual. Fort Devens, Mass.: United States Army Security Agency, 1970.

Block I.2

McCluskey, M. R., Jacobs, T. O., & Cleary, F. K. Systems engineering of training for eight combat arms MOS (HumRRO draft technical report). Alexandria, Va.: Human Resources Research Organization, June 1973.

Block I.3

Department of the Air Force. Handbook for designers of instructional systems: Task analysis (Vol. II, AFP 50-58). Washington, D. C.: Headquarters, United States Air Force, July 1973.

Johnson, E., & Mirabella, A. Test fidelity: Congruence of test conditions with actual Army tasks. Proceedings of the 16th Annual Conference of the Military Testing Association, 1974, 590-595.

Mager, R. L. Measuring instructional intent. Palo Alto, California: Fearon Publishers, 1974.

Osborn, W. C., Harris, J. H., & Ford, J. P. Functionally integrated performance testing. Proceedings of the 16th Annual Conference of the Military Testing Association, 1974, 582-589.

Swezey, R. W., & Pearlstein, R. B. Developing criterion-referenced tests. Reston, Va.: Applied Science Associates, 1974.

Taylor, J. E., Michaels, E. R., & Brennan, M. F. The concepts of performance-oriented instruction used in developing the experimental volunteer Army training program (Technical Report 72-7). Alexandria, Va.: Human Resources Research Organization, March 1972.

Thorndike, E. L. (Ed.). Educational measurement. Washington: American Council on Education, 1971.

Block I.4

No further references for Block I.4.

Block I.5

Braby, R., Henry, J. M., Parrish, W. F., Jr., & Swope, W. M. A technique for choosing cost-effective instructional delivery systems (TAEG Report No. 16). Orlando, Fla.: Department of the Navy, Training Analysis and Evaluation Group, April 1975.

Department of the Air Force. On-the-job training (AFM 50-23). Washington, D. C.: Headquarters, United States Air Force, July 1973.

Department of the Army. Trainer development program (TRADEP) progress report. Fort Benning, Ga.: United States Army Infantry School, January 1975.

Deterline Associates. Developing instructor-free instruction ((Task VI.B Report, Contract No. N61339-73-C-0150). Palo Alto, California.: Deterline Associates, 1975.

Gay, R. M. Estimating the cost of on-the-job training in military occupations: A methodology and pilot study (R-1351-ARPA). Santa Monica: The Rand Corporation, April 1974.

Haverland, E. Transfer and use of training technology: A model for matching training approaches with training settings (Interim Report). Alexandria, Va.: Human Resources Research Organization, October 1974.

Joyce, R. P., Chenzoff, A. P., Mulligan, J. L., & Mallory, W. J. Fully proceduralized job performance aids: Handbook for JPA developers. Brooks Air Force Base, Texas: Air Force Systems Command, Human Resources Laboratory, December 1973.

Stephenson, R. W., & Burkett, J. R. An action oriented review of the on-the-job training literature (AFHRL-TR-74-66). Brooks Air Force Base, Texas: Air Force Human Resources Laboratory, December 1974.

PHASE II

Block II.1

Gagne, R. M., & Briggs, L. J. Principals of instructional design. New York: Holt, Rinehart and Winston, Inc., 1974.

Gagne, R. M. The conditions of learning. (2nd ed.) New York: Holt, Rinehart and Winston, Inc., 1970.

Kibler, R. J., Cegala, D. J., Baker, L. L., & Miles, D. T. Objectives for instruction and evaluation. Boston: Allyn and Bacon, 1974.

Block II.2

Bloom, B. L. Learning for mastery. Evaluation Comment, 1968, I, No. 2.

Department of the Army. Guidelines for the conduct of performance-oriented training (TRADOC Pamphlet No. 600-11). Fort Monroe, Va.: Headquarters, United States Army Training and Doctrine Command, October 1973.

Swezey, R. W., & Pearlstein, R. B. Developing criterion-referenced tests. Reston, Va.: Applied Science Associates, 1974.

Thorndike, E. L. (Ed.). Educational measurement. Washington, D. C.: American Council on Education, 1971.

Block II.3

Thorndike, E. L. (Ed.). Educational measurement. Washington, D. C.: American Council on Education, 1971.

Block II.4

Gagne, R. M., & Briggs, L. J. Principals of instructional design. New York: Holt, Rinehart and Winston, Inc., 1974.

PHASE III

Block III.1

Braby, R., Henry, J. M., Parrish, W. F., Jr., & Swope, W. M. A technique for choosing cost-effective instructional delivery systems (TAEG Report No. 16). Orlando, Fla.: Department of the Navy, Training Analysis and Evaluation Group, April 1975.

Carroll, J. A model of school learning. Teachers College Record, 1963, 64, 723-733.

Homme, L., Csanyi, A. P., Gonzales, M. A., & Rechs, J. R. How to use contingency contracting in the classroom. Champaign, Ill.: Research Press, 1971.

Klaus, D. J. Students as teaching resources: A survey of teaching models using non-professionals (peer tutoring) (AIR 40900-10/73-FR). Pittsburgh: American Institutes for Research, October 1973.

Weingarten, K., Hungerland, J. E., & Brennan, M. F. Development and implementation of a quality-assured, peer-instructional model (HumRRO Technical Report 72-35). Alexandria, Va.: Human Resources Research Organization, November 1972.

Block III.2

Aagard, J. A., & Braby, R. Learning guidelines and algorithms for twelve types of training objectives (TAEG Report No. 23). Orlando, Fla.: Department of the Navy, Training Analysis and Evaluation Group, in press.

Braby, R., Henry, J. M., Parrish, W. F., Jr., & Swope, W. M. A technique for choosing cost-effective instructional delivery systems (TAEG Report No. 16). Orlando, Fla.: Department of the Navy, Training Analysis and Evaluation Group, April 1975.

Block III.3

Deterline, W. A., & Lenn, P. D. Coordinated instructional systems training: A self-study course for teachers. Palo Alto, Calif.: Sound Education, Inc., 1972.

Block III.4

Briggs, L. J. Handbook of procedures for the design of instruction. Pittsburg, Pa.: American Institutes for Research, 1970. (Monograph No. 4).

Department of the Air Force. Handbook for designers of instructional systems: Planning, developing, and validating instruction (Vol. IV, AFP 50-58). Washington, D. C.: Headquarters, United States Air Force, July 1973.

Deterline Associates. Developing instructor-free instruction (Task VI.B Report, Contract No. N61339-73-C-0150). Palo Alto, Calif.: Deterline Associates, 1975.

Deterline, W. A. & Lenn, P. D. Cordinated instructional systems training: A self-study course for teachers. Palo Alto, Calif.: Sound Education, Inc., 1972.

Gay, R. M. Estimating the cost of on-the-job training in military occupations: A methodology and pilot study (R-1351-ARPA). Santa Monica: The Rand Corporation, April 1974.

Joyce, R. P., Chenzoff, A. P., Mulligan, J. L., & Mallory, W. J. Fully proceduralized job performance aids: Handbook for JPA developers. Brooks Air Force Base, Texas: Air Force Systems Command, Human Resources Laboratory, December 1975.

Mager, R. F., & Pipe, P. Analyzing performance problems. Belmont, Calif.: Fearon Publishers, 1970.

The Ministry of Defense, Her Majesty's Royal Navy (Producer). Programmed instruction. London: Stewart Films, Ltd., 1970. (Film).

Block III.5

Deterline, W. A., & Lenn, P. D. Cooodinated instructional systems training: A self-study course for teachers. Palo Alto, Calif.: Sound Education, Inc., 1972.

Mager, R. L. Measuring instructional intent. Palo Alto, Calif.: Fearon Publishers, 1974.

Popham, W. J. Evaluating instruction. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1973.

Swezey, R. W., & Pearlstein, R. B. Developing criterion-referenced tests. Reston, Va.: Applied Science Associates, 1974.

PHASE IV

Block IV.1

Department of the Army. Trainer development program (TRADEP) progress report. Ft. Benning, Ga.: United States Army Infantry School, January 1975.

Block IV.2

Department of the Army. Trainer development program (TRADEP) progress report. Ft. Benning, Ga.: United States Army Infantry School, January 1975.

Gagne, R. M. Essentials of learning for instruction. New York: Holt, Rinehart & Winston, 1974.

PHASE V

Block V.1

Department of the Air Force. Handbook for designers of instructional systems: Evaluation (Vol. V, AFP 50-58). Washington, D. C.: Headquarters, United States Air Force, July 1974.

Kaufman, R. A. Educational system planning. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1972.

Swezey, R. W., & Pearlstein, R. B. Developing criterion-referenced tests. Reston, Va.: Applied Science Associates, 1974.

Thorndike, E. L. (Ed.). Educational measurement. Washington: American Council on Education, 1971.

Tracey, W. R. Designing training and development systems. New York: American Management Association, Inc., 1971.

Block V.2

Kaufman, R. A. Educational system planning. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1972.

Swezey, R. W., & Pearlstein, R. B. Developing criterion-referenced tests. Reston, Va.: Applied Science Associates, 1974.

Thorndike, E. L. (Ed.). Educational measurement. Washington: American Council on Education, 1971.

Tracey, W. R. Designing training and development systems. New York: American Management Association, Inc., 1971.

Block V.3

Kaufman, R. A. Educational system planning. Englewood Cliffs, N. J.: Prentice-Hall, Inc., 1972.

Short, J. G., Geear, L. G., Haughey, B. E., & Tien, D. T. Strategies of training development: Final report of a project to develop a fundamentals course (AIR-E-97-2/68-FR). Pittsburgh, Pa.: American Institutes for Research, February 1968.

APPENDIX B

CONTRIBUTORS

Dr. James Aagard
Training Analysis & Evaluation Group
Naval Training Center
Orlando, FL

LTC George Baker
USMC Development & Education Command
Quantico, VA

MAJ R. L. Bowersox
USMC Development & Education Command
Quantico, VA

Dr. Richard Braby
Training Analysis & Evaluation Group
Orlando, FL

Dr. Leslie Briggs
Florida State Unversity
Tallahassee, FL

Dr. Raymond Christal
Air Force Human Resources Laboratory
Lackland AFB, TX

Dr. John Danilovich
U.S. Army Signal School
Ft. Gordon, GA

Dr. William Deterline
Deterline Associates
Palo Alto, CA

Dr. Walter Dick
Florida State University
Tallahassee, FL

Dr. Walter Driskill
Occupational Survey Branch
Air Training Command
Lackland AFB, TX

Mr. Walter Eberl
U.S. Army Signal School
Ft. Gordon, GA

Dr. Ed Eisman
Naval Instructional Technical
Development Center
San Diego, CA

Mr. Buddy Evans
Chief of Naval Technical Training
Memphis, TN

Dr. Duncan Hansen
Memphis State University
Memphis, TN

Dr. Harold Hunter
University of Florida
Gainesville, FL

Dr. Charles Jackson
U.S. Army Armor School
Ft. Knox, KY

Mr. Clarence Jeter
U.S. Army Signal School
Ft. Gordon, GA

Dr. Barbara Johnson
Florida State University
Tallahassee, FL

Dr. Roger Kaufman
U.S. International University
San Diego, CA

LT Blaine Lee
USAF Air Training Command
Randolph AFB, TX

Dr. C. L. John Legere
U.S.A. Security Agency Training
Center & School
Ft. Devens, MA

MAJ E. D. Maddox
U.S. Army Combat Arms Training
Board
Ft. Benning, GA

Dr. Angelo Mirabella
U.S. Army Research Institute for
the Behavioral & Social Sciences
Arlington, VA

Dr. Bruce Monroe
Insgroup, Inc.
Huntington Beach, CA

Mr. Hal Oliver
U.S. Army Ordnance Center & School
Aberdeen Proving Grounds, MD

LTC Thomas F. Plummer
U.S. Army Combat Arms Training Board
Ft. Benning, GA

COL Billy Rutherford
U.S. Army Infantry School
Ft. Gordon, GA

Dr. Frank Sands
Naval Instructional Technical Development
Center (NITDC)
San Diego, CA

Mr. Carl Serger
U.S. Army Training & Doctrine Command
Ft. Monroe, VA

Dr. James Sherrill
U.S.A. Institute of Administration
Ft. Benjamin, Harrison, IND

MAJ D. R. Stefanson
USMC Development & Education Command
Quantico, VA

Dr. Robert Sulzen
AFHRL Advanced Systems Division
Wright Patterson AFB, Ohio

Mr. Robert H. Summers
USAF SAAS
Lowry AFB, TX

Dr. Robert Swezey
Applied Science Associates
Reston, VA

Dr. John E. Taylor
Human Resources Research Organization (HumRRO)
Western Division
Presidio of Monterey, CA

APPENDIX C

DATA FROM FIRST TRYOUTS

PRETEST/POSTTEST SCORES

SCORE	# PARTICIPANTS PRETEST	POSTTEST	POSSIBLE 100
71-75			
66-70		X	
61-65		XXXX	
56-60	X	XXXXXXXX	
51-55		XXXXX	
46-50	XX	XXXXX	
41-45	X	XX	
36-40	XXXX	XXXX	
31-35	XXX		
26-30	XX		
21-25	XXXXX		
16-20	XXXX		
11-15	XXXX		
6-10	XX		
0-5	XXX		

WORKBOOK EXERCISE SCORES

SCORE	# PARTICIPANTS	POSSIBLE 100
181-190	X	
171-180	X	
161-170	XXX	
151-160	XXXX	
141-150	XXX	
131-140	XXXXXX	
121-130	XXX	
111-120	XX	
101-110	X	
91-100		
81-90	X	
71-80		
61-70	X	
51-60		
41-50		
31-40	X	

	CLARITY OF UNDERSTANDING	LENGTH	SUFFICIENCY OF INFORMATION	TECHNICAL NATURE	RECOGNITION OF THE SIGNIFICANCE	RELEVANCE OF THE EXAMPLES USED	DEGREE OF DETAIL	AMOUNT OF REVISION REQUIRED TO IMPROVE USEFULNESS	USE OF UNFAMILIAR TERMS	USEFULNESS TO SOMEONE IN ISO FIELD
P-211 BLOCK I.1	71% G or Sat	74% G or Sat	64% G or Sat	65% Sat	86% G of Sat	77% G or Sat	70% G or Sat	69% G or Sac	63% Sat or P	70% VG or G
Q-212 BLOCK I.2	74% VG or G	81% G or Sat	78% G or VG	96% G or Sat	84% G or Sat	92% VG, G, or Sat	85% G or Sat	79% G or Sat	59% G or Sat 30% VP	75% VG or G
R-213 BLOCK I.3	84% VG, G, or Sat	68% G or Sat	78% G or Sat	83% G or Sat	72% G or Sat	75% G or Sat	75% G or Sat	72% G or Sat	69% G or Sat	62% G or Sat
S-214 BLOCK I.4	89% VG, G, or Sat	82% G or Sat	78% G or Sat	81% Sat	71% G or Sat	85% VG, G, or Sat	80% Sat or P	76% G, Sat, or P (ex.)	65% Sat or P	60% G or Sat
T-215 BLOCK I.5	58% G or Sat	75% G or Sat	71% G or Sat	73% G or Sat	72% G or Sat	73% G or Sat	66% Sat or P. 20% VG	61% G of Sat	77% G or Sat	85% VG, G, or Sat
V-221 BLOCK II.1	78% G or Sat	88% G or Sat	75% G or Sat	82% G or Sat	86% G or Sat	68% G or Sat	84% G, Sat, or P	78% G, Sat, or P	72% G or Sat	74% G or Sat
V-222 BLOCK II.2	63% VG or G	89% G or Sat	71% G or Sat	79% Sat	65% G or Sat	62% G or Sat	75% Sat	71% G or Sat	71% Sat or P	63% VG or G
W-223 BLOCK II.3	54% Sat or P	74% G or Sat	75% Sat or P	72% VG or G	62% G or Sat	75% G or Sat	60% G or Sat	33% VG 29% Sat	76% G or Sat	56% G or Sat

VG = Very Good Sat = Satisfactory
G = Good P = Poor

SUMMARIZED RESPONSES FROM EVALUATION QUESTIONNAIRES ON MANUALS

	RELEVANCE TO THE OBJECTIVE	VALUE RECEIVED	DEGREE OF DIFFICULTY	LENGTH	INSIGHT GAINED BY PARTICIPATION IN THE EXERCISE	AMOUNT OF REQUIRED REVISION TO IMPROVE USEFULNESS
H-311 WORKBOOK I.1	87% VG or G	63% G or Sat	79% G or Sat	85% G or Sat	64% G	55% G or Sat
I-312 WORKBOOK I.2	93% VG or G	82% G or Sat	88% G or Sat	81% Sat	81% VG or G	61% G or Sat
J-313 WORKBOOK I.3	78% VG or G	57% G	65% Sat or P	61% G or Sat	73% G or Sat	73% VG, G, or Sat
K-314 WORKBOOK I.4	59% G or Sat	63% G or Sat	74% Sat	70% Sat	63% Sat, P, or VP	56% VG or G
L-315 WORKBOOK I.5	62% VG or G	65% G or Sat	76% Sat or P	60% G or Sat	62% Sat or P	69% G or Sat
M-321 WORKBOOK II.1	80% VG or G	67% VG or G	77% Sat	83% G or Sat	87% VG, G, or Sat	55% G or Sat
N-322 WORKBOOK II.2	74% VG or G	78% G or Sat	83% G or Sat	87% G or Sat	87% G or Sat	57% G or Sat
O-323 WORKBOOK II.3	65% G or Sat	72% Sat or P	59% Sat or P	70% Sat	61% G or Sat	52% G or Sat

VG = Very Good
G = Good
Sat = Satisfactory
P = Poor
VP = Very Poor

SUMMARIZED RESPONSES FROM EVALUATION QUESTIONNAIRES ON WORKBOOKS

	PRESENTATION WAS RELEVANT TO THE OBJECTIVE	QUALITY OF THE PRESENTATION	PRESENTATION IS A VALUABLE PART OF THE WORKSHOP	COMPLETENESS	USE AS INTRODUCTION MATERIAL	LENGTH	HOW WELL DID THE MATERIAL MAINTAIN YOUR INTEREST	SCHEDULING (AT THE PARTICULAR TIME IN THE SKED. OF ACTIVITIES)	CLARITY (OF UNDERSTANDING)	SUBSTANCE
B-110 ISD WORKSHOP BRIEFING	89% G or VG	83% G or VG	75% G or VG	67% H or VH	83% G or VG	87% G or VG	62% G or Sat	81% G or VG	81% H or VH	79% G or VG
A-111 AF-ISD VIDEO TAPE	76% G or VG	68% G or VG	62% G or VG	64% H or VH	90% G or VG	69% Sat	75% G of Sat	78% G or VG	77% H or VH	69% G of Sat
G-112 M203 - TEC	93% VG or G	72% G or VG	62% G or Sat	69% G of Sat	72% VG or G	73% G or Sat	75% G or Vg	70% VG or G	80% VG or G	72% VG or G
F-113 PORT & HARBOR VIDEO	83% VG or G	73% VG or G	57% G or Sat	70% G or Sat	60% VG or G	79% G or Sat	82% G or Sat	86% VG or G	61% VG or G	69% VG or G
E-114 PORT & HARBOR AUDIO	94% VG or G	73% VG or G	73% VG or G	77% Sat or G	77% VG or G	83% G or Sat	68% VG or G	82% VG or G	75% VG or G	77% VG or G
D-115 NAVY VT ON "WE NEED YOUR HELP"	52% Sat or P	52% Sat or P	52% P or VP	64% Sat of P	68% Sat P or VP	80% G or Sat	64% Sat or P	64% Sat or G	54% VG or G	57% Sat or P
C-116 POT FILM	73% G or VG	69% G or VG	65% G or VG	65% G or VG	73% G or VG	76% G or Sat	69% G or VG	64% G or Sat	69% G or VG	64% G or VG

VG = Very Good
G = Good
VH = Very High
H = High

Sat = Satisfactory
P = Poor
VP = Very Poor

SUMMARIZED RESPONSES FROM EVALUATION QUESTIONNAIRES ON MEDIATED MATERIALS